Image AF/2855

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants:	I hereby certify that this paper is being deposited with the United States Postal Service as first class mail, postage pre-paid, in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on this date:
Karbassi, et al.	
Serial No.: 09/634,507	
Filed: August 9, 2000	
For: **FLOW SENSOR PACKAGE**	
Group Art Unit: 2855	March 8, 2004 (Date)
Examiner: L. Martir	
Attorney Docket No.: H25086-US	Trevor B. Joike Reg. No. 25,542 Attorney for Applicants

APPELLANTS' BRIEF

Commissioner for Patents
Washington, DC 20231

Sir:

Pursuant to the provisions of 37 CFR §1.192, Appellants submit the following brief.

1. Real Party in Interest

The real party in interest is Honeywell International, Inc. of Morristown, N.J.

2. Related Appeals and Interferences

There are no other appeals and interferences known to Appellants, Appellants' legal representatives or assignees which will directly affect or be affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims

Claims 1-4, 6, 7, 9, and 11-28 are pending in the application and are under final rejection. The final rejection of claims 1-4, 6, 7, 9, and 11-28 is appealed.

4. Status of Amendments

All amendments have been entered.

5. Summary of the Invention

As shown in the drawings, a flow sensor package 10 includes a housing 12 that has an inlet port 14, an outlet port 16, a lead 18a, a first channel 20, a second channel 21, and channels 22 ands 23. The first channel 20 communicates with the inlet port 14 and the outlet port 16 through the channels 22 and 23, and the second channel 21 also communicates with the inlet port 14 and the outlet port 16 through the channels 22 and 23. The

inlet port 14 receives a fluid, and the outlet port 16 discharges the fluid from the flow sensor package 10, although the flow sensor package 10 can be bidirectional as shown by the arrows in Figures 1a and 1b. The lead 18a is coupled to a measuring apparatus 26.

The second channel 21 includes a restriction 28. The first channel 20 includes a pressure sensing element 30, such as a pressure transducer with a conductive elastomeric seal. The pressure sensing element 30 detects a pressure change created by the restriction 28, and may be coupled to the lead 18a through the conductive elastomeric seal.

The restriction 28 in the second channel 21 creates a pressure drop (pressure change) from one face of the pressure sensing element 30 to the other in the first channel 20. The pressure sensing element 30 (with, for example, an elastomeric seal) prevents flow of the fluid through the first channel 20, and the pressure sensing element 30 measures the pressure drop created by the restriction 28. The pressure sensing element 30 sends a signal to the measuring apparatus 26 through the lead 18a.

As shown in Figure 2, an elastomeric seal 32 is provided in the housing 12 and has a conductive path from

the sensing element 30 to the lead 18a. The housing 12 also includes an alignment well 34 in the first channel 20. The housing 12 includes only two portions, a base 36 and a cover 38. The base 36 includes the alignment well 34, a portion of the first channel 20, a portion of the second channel 21, the channel 22, and the inlet port 14. The cover 38 includes the remainder of the first channel 20, the remainder of the second channel 21, the channel 23, and the outlet port 16.

The alignment well 34 supports the elastomeric seal 32, another elastomeric seal 40, and the pressure sensing element 30. The pressure sensing element 30 is positioned between the elastomeric seals 32 and 40 in order to prevent flow through the first channel 20. The pressure sensing element 30 is oriented so that it is electrically coupled to the conductive elastomeric seal 32 and so that the elastomeric seal 40 rests on the pressure sensing element 30.

An additional elastomeric seal 44 prevents leakage of the fluid from the second channel 21, thereby allowing the restriction 28 to create a pressure change across the pressure sensing element 30. In the case of the embodiment shown in Figure 2, the restriction 28 is

formed because the second channel 21 has a smaller diameter along its length than do the channels 22 and 23.

The pressure sensing element 30 measures the pressure drop (pressure change) across the pressure sensing element 30 and provides an electrical output signal to the conductive elastomeric seal 32. The conductive elastomeric seal 32 is electrically coupled to the measuring apparatus 26 through the lead 18a so that the electrical output signal from the pressure sensor element 30 reaches the measuring apparatus 26.

With this arrangement, the pressure sensing element 30 is integrated with the restriction 28 in the housing 12 and is sealed by elastomeric seals 32 and 40 to form a low-cost, highly-manufacturable flow sensor package 10 to measure the flow rate of a fluid.

Figure 3 shows an alternate embodiment in which the first channel 20 and 22 and the second channel 21 and 23 are not parallel to one another.

6. Issues

Issue 1 - Whether claims 20, 21, and 23 are anticipated under 35 U.S.C. §102(b) by Cook, et al., U.S. Patent No. 5,412,994 (hereinafter, "the Cook '994 patent").

Issue 2 - Whether claims 1, 2, 6, 7, 9, 11, 12, 15-17, and 19 are unpatentable under 35 U.S.C. §103(a) over Frick, U.S. Patent No. 4,466,290 (hereinafter, "the Frick '290 patent") in view of the Cook '994 patent. (The Examiner does not specifically reject dependent claim 18 in the Final Rejection. However, because dependent claim 18 is similar to dependent claims 16 and 19, and because no claim has been allowed herein, applicant treats dependent claim 18 as if it were rejected. Also, the Examiner does not specifically reject dependent claims 25-28 in the Final Rejection. However, because the Examiner discusses dependent claims 25-28 on page 8 of the Final Rejection as if they were rejected, applicant treats them as rejected.)

Issue 3 - Whether claims 3, 4, 13, 14, and 22-24 are unpatentable under 35 U.S.C. §103(a) over the Frick '290 patent in view of the Cook '994 patent and further in view of Maurer, U.S. Patent No. 5,184,107 (hereinafter, "the Maurer '107 patent").

7. Grouping of Claims

For purposes of this appeal, claims 1, 6, 7, 9, and 24 may be grouped together, claims 11, 15, and 17 may

be grouped together, and claims 20 and 21 may be grouped together.

Otherwise, the appealed claims are treated separately.

8. Argument

The Cook '994 Patent

The Cook '994 patent discloses a sensor die 10 and a buffer member 12. An electronic circuit 18 and three conductive pads 20, 22 and 24 are provided on a first surface 14 of the sensor die 10. A cavity 44 is etched in a second surface 16 of the sensor die 10 to form a diaphragm 50. An opening 36 is formed through the buffer member 12, and a channel 40 is formed in a surface 30 of the buffer member 12 and is disposed in fluid communication with the opening 36. A fluid conduit 60 is attached to the buffer member 12 so that fluid communication is established between the fluid conduit 60, the opening 36, the channel 40, and the cavity 44. Pressure sensing components 51 are formed on the diaphragm 50.

As shown in Figure 7 of the Cook '994 patent, the buffer member 12 is disposed above the sensor die 10, a first housing member 80 has the fluid conduit 60

extending therethrough, and a second housing member 84 is shaped to mate with the first housing member 80 such that the sensor die 10 and the buffer member 12 are housed therebetween. The fluid conduit 60 is in fluid communication with the opening 36 of the buffer member 12. A seal 90 is provided between the buffer member 12 and the first housing member 80 around the fluid conduit 60. In order to provide electrical communication between the contact pads 20, 22 and 24 and external devices, a plurality of electrically conductive leads 94 extend through the second housing member 84. An elastomeric conductor 98 is disposed in contact with the contact pads 20, 22 and 24 and the electrically conductive leads 94. A second fluid conduit 100 is provided through the housing member 84 in order to permit the pressure sensor to measure differential pressures.

The Frick '290 Patent

The Frick '290 patent discloses a pressure transmitter 10 having four major (and separate) components, an input/output unit 12, a pressure transducer 14, a flange 16, and an orifice 28/30. The input/output unit 12 is connected to the pressure transducer 14 by a neck 18. The flange 16 is connected

by pipes 24 and 26 to the orifice 28/30, and the flange 16 is mounted to the pressure transducer 14 by bolts 27.

The pipe 24 is connected to one side of the orifice 28/30, and the pipe 26 is connected to the other side of the orifice 28/30. The orifice 28/30 provides a pressure drop as a function of flow through a conduit 32. The pipe 24 connects one side of this pressure drop (high or low) to a passageway 36 in the flange 16, and the pipe 26 connects the other side of this pressure drop (low or high) to a passageway 38 in the flange 16.

The passageways 36 and 38 couple the pipes 24 and 26 to fluid chambers 40 and 42 of the flange 16. The fluid chambers 40 and 42 cooperate with first and second pressure sensing and transmitting means formed in the pressure transducer 14 when the flange 16 and the pressure transducer 14 are mated together. The first and second pressure sensing and transmitting means comprise isolation diaphragms 50 and 52 disposed in the pressure transducer 14.

The isolation diaphragms 50 and 52 are joined at their rims 54 and 54A to the pressure transducer 14. Seals 58, such as O-ring seals, are interposed between the pressure transducer 14 and the flange 16 annular to

the rims 54 and 54a of the isolation diaphragms 50 and 52 in order to seal the fluid chambers 40 and 42.

Fluid cavities 61 and 63 are formed in the transducer 14 such that the isolation diaphragm 50 isolates the fluid chamber 40 from the fluid cavity 61 and such that the isolation diaphragm 52 isolates the fluid chamber 42 from the fluid cavity 63. Fluid conduits 62 and 64 couple the fluid cavities 61 and 63 to a sensor element 66 of the input/output unit 12. The fluid conduits 62 and 64 are filled with a substantially incompressible fluid 65. A measuring diaphragm 72 of the sensor element 66 separates chambers 68 and 70.

A differential pressure is developed by the orifice 28/30 and is conveyed by the pipes 24 and 26 through the passageways 36 and 38 to the chambers 40 and 48 where the differential pressure differentially acts on the isolation diaphragms 50 and 52. This differential pressure differentially deflects the isolation diaphragms 50 and 52 to create a differential pressure between the fluid cavities 61 and 63, and this differential pressure is transmitted through the incompressible fluid 65 in the fluid conduits 62 and 64 to the chambers 68 and 70 of the sensor element 66.

The sensor element 66 is externally excited by the input/output unit 12 via electrical leads 74. In response to the differential pressure in the chambers 68 and 70, the measuring diaphragm 72 deflects to vary the capacitance of the sensor element 66, which alters the external exciting signal. This change in the exciting signal is representative of the differential pressure and is transmitted through the electrical leads 74 and through the input/output unit 12 to external leads 15.

Alternatively, the Frick '290 patent discloses that the sensor element 66 may be located near the isolation diaphragms 50 and 52 and may be supported in the transducer 14 instead of in the input/output unit 12. The Frick '290 patent also discloses that the first and second pressure sensing and transmitting means may directly sense fluid pressure such as when they comprise strain gauges. However, the Frick '290 patent does not disclose how the pressure transducer 14 is to be modified to accommodate such alternatives.

The Frick '290 patent further discloses that a calibration manifold 17 may be used instead of the flange 16 between the pipes 24, 26 and the pressure transducer 14. The calibration manifold 17 includes three valves

84, 86, and 88 that may be adjusted to permit calibration of the pressure transmitter 10.

The Maurer '107 Patent

The Maurer '107 patent discloses a piezoresistive pressure transducer 10 that has a housing comprising first and second pieces 12 and 20. The first piece 12 has a cavity 14 which extends part way through the first piece 12. A pressure port 17 of the first piece 12 communicates with the cavity 14. Leads 18a pass through the first piece 12 into the cavity 14. The second piece 20 has a pressure port 24. First and second elastomeric seals 30 and 32 are in the cavity 14. A square chip 34 is between first and second elastomeric seals 30 and 32 and forms a central diaphragm 42. The chip 34 carries piezoresistive stress sensitive elements. The first elastomeric seal 30 is adapted to selectively conduct current from the piezoresistive stress sensitive elements on the chip 34 to the leads 18a. The two seals 30 and 32 and the chip 34 create a pressure tight seal across the central diaphragm 42.

Issue 1

Independent claim 20 is directed to a method of determining flow rate through a flow conductor comprising creating a pressure change within a housing having only two separate housing portions, sensing the pressure change using a sensing element mounted within the housing, sealing the sensing element within the housing using a seal, and communicating an electrical signal from the sensing element to an exterior of the housing.

The Cook '994 patent does not disclose the step of creating a pressure change within a housing having only two separate housing portions. More specifically, while the arrangement shown in Figure 7 of the Cook '994 patent can be used to sense a pressure differential, and while this pressure differential may exist within the housing comprising the housing members 80 and 84, there is no disclosure in the Cook '994 patent that the pressure differential is created within this housing members 80 and 84.

Indeed, as far as the disclosure of the Cook '994 patent is concerned, the pressure differential is created outside of the housing. For example, there is no disclosure of a restriction within the Cook housing that restricts flow to thereby create a pressure differential.

The Examiner asserts that the Cook '994 patent at column 7, lines 18-28 teaches creating a pressure differential within the housing. However, this portion of the Cook '994 patent merely discloses that the pressure sensor can be used to measure differential pressures. This portion of the Cook '994 patent does not disclose that the pressure differential is created within the housing.

Accordingly, because the Cook '994 patent does not disclose creating a pressure differential within the housing, the Cook '994 patent does not anticipate independent claim 20.

Moreover, the Cook '994 patent does not disclose a method of determining a flow rate.

Accordingly, for this reason also, the Cook '994 patent does not anticipate independent claim 20.

In the Final Rejection, the Examiner did not respond to applicant's first argument that the Cook '994 patent fails to disclose the creation of a pressure differential within its two part housing.

In the Final Rejection, the Examiner did respond to applicant's second argument that the Cook '994 patent fails to disclose a method of determining a flow rate by asserting that (i) the flow rate determining

language is in the preamble of independent claim 20 and, therefore, need not be given any patentable weight, and (ii) the determination of flow rate does not appear in independent claim 20 and applicant has merely read this limitation into independent claim 20 from the specification.

In rebuttal to this response by the Examiner, applicant notes that the flow rate language in independent claim 20 must be given consideration because the flow determining language in independent claim 20 gives life and meaning to the other limitations in independent claim 20. Thus, these other limitations would not have meaning unless they are in support of a method for determining a flow rate.

Moreover, the flow rate language in independent claim 20 should be given weight because the pressure change creation limitation in independent claim 20 supports the flow rate language. That is, a pressure change is created within a housing based on a flow rate through the housing. Thus, the flow rate can be determined as a function of this pressure change.

Accordingly, for both of the above reasons, the flow rate language of independent claim 20 cannot be ignored.

The Examiner in the Advisory Action responded to neither of applicant's first and second arguments.

For the reasons given above, the Cook '994 patent does not anticipate independent claim 20.

Because independent claim 20 is not anticipated by the Cook '994 patent, dependent claims 21 and 23 are likewise not anticipated by the Cook '994 patent.

Issue 2

Independent claim 1 is directed to a flow sensor package having a housing, a sensing element, a restriction, and a seal. The housing has an inlet, an outlet, and first and second channels in communication with the inlet and the outlet. The sensing element is in the first channel, and the restriction is in the second channel. The seal engages the sensing element so as to prevent flow of a fluid past the sensing element, the seal has an electrically conductive path from the sensing element to a lead, and the lead is outside of the housing.

The Examiner maintains that the element 88 as disclosed in the Frick '290 patent is the restriction of independent claim 1. However, the element 88 is described as a valve, and its function, according to the

Frick '290 patent, is to (i) selectively enable fluid pressure exchange between the first and second fluid passageways 36A and 38A to permit the pressure transmitter 10 to be calibrated, and (ii) selectively disable fluid pressure exchange between the first and second fluid passageways 36A and 38A to permit the pressure transmitter 10 to sense differential pressures.

In other words, the valve 88 is either open or closed. When the valve 88 is open, it is no restriction, and the pressure in the passageways 36 and 38 equalize so that there is no pressure differential applied to the sensor element 66 and the pressure transmitter can be calibrated. On the other hand, when the valve 88 is closed, it again is no restriction, and the differential pressure created by the orifice 28/30 is allowed to act differentially on the isolation diaphragms 50 and 52, and the output of the sensor element 66 reflects this differential pressure.

Therefore, as can be seen from the above, the valve 88 is not a restriction.

Because the Cook '994 patent likewise discloses no restriction in a channel of the housing, the combination of the Frick '290 patent and the Cook '994 patent cannot teach or suggest the invention of

independent claim 1. Therefore, independent claim 1 is patentable over the Frick '290 patent in view of the Cook '994 patent.

Moreover, the Examiner recognizes that the Frick '290 patent fails to teach the invention of independent claim 1 in a number of respects. Therefore, the Examiner relies on the Cook '994 patent. However, the Examiner is rather vague about how the pressure sensor disclosed in the Frick '290 patent should be modified in view of the Cook '994 patent to meet the limitations of independent claim 1.

For example, as the Examiner recognizes, the sensor element 66 is not in the first channel 36A (or in the second channel 38A), as the Examiner interprets the Frick '290 patent vis-à-vis independent claim 1. Moving the sensing element 66 to the first channel 36A (or the second channel 38A) does not make sense because there is no differential pressure in either of these channels. The differential pressure exists only across these channels 36A and 38A.

The Examiner appears to assert, however, that it would have been obvious in view of the Cook '994 patent to move the sensor element 66 directly across the first channel 36A and the second channel 38A in order to

make the sensor small and compact. Yet, such a modification is directly contrary to the teaching of the Frick '290 patent, which instead discloses a need to isolate the sensor element 66 from the first and second channels 36A and 38A. Therefore, the Frick '290 patent teaches away from moving the sensor element 66 directly across the first channel 36A and the second channel 38A.

The Examiner further recognizes that the Frick '290 patent fails to disclose a conductive seal that engages the sensor element 66 and that conducts signals from the sensor element 66 to outside of the housing. The Frick '290 patent does disclose a pair of seals 58. However, these seals do not engage sensor element 66 and they are not disclosed in the Frick '290 patent as being conductive.

In order to combine a conductive seal with the pressure transmitter 10 disclosed in the Frick '290 patent, the Examiner appears to assert that it would have been obvious in view of the Cook '994 patent to seal the sensor element 66 with the conductive seal 98 disclosed in the Cook '994 patent. However, the sensor element 66 disclosed in the Frick '290 patent is a capacitive type sensor, and the Examiner has not suggested how such a capacitive sensor element can be sealed by the seal 98

disclosed in the Cook '994 patent without interfering with the operation of the sensor element 66. That is, the Examiner has not suggested why electrical contact or proximity between the capacitive type sensor element 66 disclosed in the Frick '290 patent and the conductive seal 98 disclosed in the Cook '994 patent would not impair the operation of the sensor element 66.

Accordingly, the Examiner has not carried the burden of establishing a prima facie case of obviousness with respect to independent claim 1.

Therefore, because the Frick '290 patent fails to teach a restriction in the first channel 36A (or, for that matter, in the second channel 38A), because the Frick '290 patent teaches away from moving the sensor element 66 to a position where it is directly between the first and second channels 36A and 38A, and because the Examiner has not carried the burden of establishing a prima facie case of obviousness with respect to sealing the sensor element 66 by way of a conductive seal, independent claim 1 would not have been obvious over the Frick '290 patent in view of the Cook '994 patent.

In the Final Rejection, the Examiner did not respond to applicant's argument that the Frick '290 patent teaches away from moving the sensor element 66 to

a position where it is directly between the first and second channels 36A and 38A, and the Examiner did not respond to applicant's argument that the Examiner has not carried the burden of establishing a prima facie case of obviousness with respect to sealing the sensor element 66 by way of a conductive seal.

The Examiner did respond to applicant's argument regarding the valve 88. However, applicant is not quite sure of the Examiner's point. Independent claim 1 requires a restriction, whereas the Frick '290 patent shows a valve (i.e., the valve 88). There is no suggestion to operate the valve 88 as a restriction.

Moreover, as discussed above, the Frick '290 patent describes the valve 88 as an on/off valve. That is, as disclosed in column 7, line 53 through column 8, line 21 of the Frick '290 patent, the valve 88 is opened during calibration to transmit the pressure of the fluid in fluid passageway 36A to the fluid passageway 38A thereby equalizing the fluid pressure in both first and second fluid chambers 40 and 42. After calibration and during normal operation of the differential pressure transmitter 10, the valve 88 is closed so that the first and second fluid passageways 36A and 38A are fluidly isolated from each other.

As can be seen, the Frick '290 patent does not suggest that the valve 88 is a restriction and further does not suggest that the valve 88 be replaced by a restriction.

Accordingly, the valve 88 does not meet the claimed limitation of a restriction.

Furthermore, as discussed above, the passage from the Frick '290 patent cited by the Examiner shows that the valve 88 is not a restriction. The valve 88 either allows pressure between the passages 36A and 38A to be equal (which is not the function of a restriction) or isolates the passages 36A and 38A from one another (which again is not the function of a restriction).

In the Advisory Action, the Examiner argues that the valve 88 does limit flow and, therefore, is a restriction. However, as disclosed in the Frick '290 patent, the valve 88 is operated between full open during calibration and full closed during normal operation. When the valve 88 is full open, it does not restrict anything. When the valve 88 is full closed, it again does not restrict anything, unless one can call an impervious wall a restriction. However, calling an impervious wall a restriction makes the term restriction

meaningless because a restriction restricts flow, it does not stop it.

In the Advisory Action, the Examiner did not respond to applicant's argument that the Frick '290 patent teaches away from moving the sensor element 66 to a position where it is directly between the first and second channels 36A and 38A, and the Examiner did not respond to applicant's argument that the Examiner has not carried the burden of establishing a prima facie case of obviousness with respect to sealing the sensor element 66 by way of a conductive seal. Each of these reasons means that independent claim 11 is patentable over the Frick '290 patent in view of the Cook '994 patent.

For all of the reasons give above, independent claim 1 is patentable over the Frick '290 patent in view of the Cook '994 patent.

Because independent claim 1 would not have been obvious over the Frick '290 patent in view of the Cook '994 patent, dependent claims 1, 6, 7, and 9 likewise would not have been obvious over the Frick '290 patent in view of the Cook '994 patent.

Independent claim 11 is directed to a flow sensor package comprising a housing, an inlet, an outlet, first and second channels in communication with the inlet

and the outlet, a sensing element, a restriction, and a seal. The sensing element is in the first channel, the sensing element has first and second opposing sides, the first side is in fluid communication with the inlet, and the second side is in fluid communication with the outlet. The restriction is in the second channel, and the restriction permits flow of a liquid through the inlet, the second channel, and the outlet. The seal engages the sensing element so as to prevent flow of the liquid past the sensing element, and the sensing element senses a pressure change across the restriction.

As indicated above in connection with independent claim 1, the valve 88 as disclosed in the Frick '290 patent is not a restriction that permits flow of a fluid through an inlet, a second channel, and an outlet. The valve 88 either is fully open during calibration and, therefore, is not a restriction, or the valve 88 is fully closed during normal operation and, therefore, is again not a restriction allows and does not permit flow.

Moreover, the Examiner recognizes that the sensor element 66 disclosed in the Frick '290 patent is not in the first channel 36A (or in the second channel 38A). Moving the sensing element 66 to the first channel

36A (or the second channel 38A) will not meet the language of independent claim 11 because there is no differential pressure in the first channel 36A (or in the second channel 38A). The differential pressure exists only across these channels 36A and 38A.

Also, moving the sensor element 66 to the first channel 36A (or to the second channel 38A) would not meet the language of independent claim 11 because then, while the first side of the sensing element 66 would be in fluid communication with the inlet, the second side of the sensor element 66 would not be in fluid communication with the outlet. The isolation diaphragms 50 and 52 would prevent the second side of the sensor element 66 from being in fluid communication with the outlet.

Additionally, it would not have been obvious to move the sensor element 66 directly across the first channel 36A and the second channel 38A in order to make the sensor small and compact, as asserted by the Examiner. Such a modification is directly contrary to the teaching of the Frick '290 patent, which instead discloses a need to isolate the sensor element 66 from the first and second channels 36A and 38A. Indeed, the Frick '290 patent teaches away from such a modification of the pressure transmitter 10.

Therefore, because the Frick '290 patent fails to teach a restriction in the first channel 36A (or in the second channel 38A), because moving the sensor element 66 to the first channel 36A (or to the second channel 38A) would not meet the language of independent claim 11, and because the Frick '290 patent teaches away from moving the sensor element 66 to a position where it is directly between the first and second channels 36A and 38A, independent claim 11 would not have been obvious over the Frick '290 patent in view of the Cook '994 patent.

The Examiner's response in connection with independent claim 11 and the applicant's rebuttal thereto are essentially the same as set out above in connection with independent claim 1.

In the Advisory Action, and as discussed above, the Examiner argues that the valve 88 does limit flow and, therefore, is a restriction. However, as also discussed above, the valve 88 is operated as a valve, not as a restriction.

In the Advisory Action, and as discussed above, the Examiner did not respond to applicant's argument that the Frick '290 patent teaches away from moving the sensor element 66 to a position where it is directly between the

first and second channels 36A and 38A, and the Examiner did not respond to applicant's argument that the Examiner has not carried the burden of establishing a prima facie case of obviousness with respect to sealing the sensor element 66 by way of a conductive seal. Each of these reasons means that independent claim 11 is patentable over the Frick '290 patent in view of the Cook '994 patent.

For all of the reasons give above, independent claim 11 is patentable over the Frick '290 patent in view of the Cook '994 patent.

Because independent claim 11 would not have been obvious over the Frick '290 patent in view of the Cook '994 patent, dependent claims 12, 15-17, and 19 likewise would not have been obvious over the Frick '290 patent in view of the Cook '994 patent.

Additionally, dependent claims 2 and 12 recite that the housing includes a base and a cover. Moving the sensing element 66 across the first and second channels 36A and 38A as suggested by Examiner still would not produce a housing that has a base and a cover and that contains the sensing element, the restriction, and the seal.

The Examiner argues that, because the Frick '290 patent discloses two portions (which the Examiner does not identify and which are difficult to determine given the Examiner's suggested modification of the system disclosed in the Frick '290 patent), and because the Cook '994 patent discloses a housing having two housing portions, it would have been obvious in view of the Cook '994 patent to provide the housing as recited in dependent claims 2 and 12 to contain the sensing element, the restriction, and the seal disclosed in the Frick '290 patent.

The motivation to make this modification according to the Examiner is that leakage will occur and, therefore, a more accurate sensing arrangement will result. However, there is no suggestion that the arrangement disclosed in the Frick '290 patent is leaky and requires better sealing. Therefore, the motivation proffered by the Examiner is not supported and does not itself support or equal a suggestion to modify the arrangement disclosed in the Frick '290 patent as argued by the Examiner.

Moreover, neither the Frick '290 patent nor the Cook '994 patent suggests the Examiner's modification. The Frick '290 patent discloses a device having many

different housings, and the Cook '994 patent, while disclosing a two part housing 80/84, does not disclose a two part housing that contains a restriction in addition to a sensing element and a seal.

Accordingly, dependent claims 2 and 12 are patentable over the Frick '290 patent in view of the Cook '994 patent.

Dependent claims 16, 18, and 19 further recite that the seal of independent claim 11 has a conductive path from the sensing element to a lead, and that the lead extends outside of the housing. As discussed above, the Frick '290 patent does not disclose a seal having a conductive path from the sensing element to a lead, and further does not disclose that the lead extends outside of the housing.

Moreover, the diaphragms 50 and 52 are not the seal recited in dependent claims 16, 18, and 19 because the diaphragms 50 and 52 do not engage a sensing element so as to prevent flow of a fluid past the sensing element. Also, the sensing element 66 is not in a first channel that is in fluid communication with a second channel containing the restriction. Therefore, even if the sensing element 66 does have a seal, this seal would not meet the limitations of dependent claims 16, 18, and

19. (It is noted that, as discussed above, there is no disclosure in the Frick '290 patent that the sensing element 66 has a seal.)

In order to combine a conductive seal with the pressure transmitter 10 disclosed in the Frick '290 patent, the Examiner appears to assert that it would have been obvious in view of the Cook '994 patent to seal the sensor element 66 with the conductive seal 98 disclosed in the Cook '994 patent. However, the sensor element 66 disclosed in the Frick '290 patent is a capacitive type sensor, and the Examiner has not suggested how such a capacitive sensor element can be sealed by the seal 98 disclosed in the Cook '994 patent without interfering with the operation of the sensor element 66. That is, the Examiner has not suggested why electrical contact between the capacitive type sensor element 66 disclosed in the Frick '290 patent and the conductive seal 98 disclosed in the Cook '994 patent would not impair the operation of the sensor element 66.

Accordingly, the Examiner has not carried the burden of establishing a prima facie case of obviousness with respect to dependent claims 16, 18, and 19.

Dependent claim 25 further recites that the step of creating a pressure change within a housing

comprises the step of creating the pressure change within the housing by use of a restriction. As discussed above, because there is no suggestion of providing a restriction in the same housing as a sensing element and a seal, dependent claim 25 is not unpatentable over the Frick '290 patent in view of the Cook '994 patent.

Dependent claim 26 further recites that the seal comprises a perimeter commensurate with a perimeter of the sensing element. As discussed above, because there is no suggestion of providing a conductive seal around the conductive sensing element 66 disclosed in the Frick '290 patent, dependent claim 26 is not unpatentable over the Frick '290 patent in view of the Cook '994 patent.

Dependent claims 27 and 28 recite that the seal and the sensing element are coaxial. As discussed above, because there is no suggestion of providing a conductive seal around the conductive sensing element 66 disclosed in the Frick '290 patent, dependent claims 27 and 28 are not unpatentable over the Frick '290 patent in view of the Cook '994 patent.

Issue 3

With respect to independent claims 1, 11, and 20, the Maurer '107 patent is redundant. Therefore, the Maurer '107 patent does not supply any of the deficiencies of the Frick '290 patent and the Cook '994 patent with respect to these claims.

Accordingly, independent claims 1, 11, and 20 would not have been obvious over the Frick '290 patent in view of the Cook '994 patent and further in view of the Maurer '107 patent.

Because independent claims 1, 11, and 20 would not have been obvious over the Frick '290 patent in view of the Cook '994 patent and further in view of the Maurer '107 patent, dependent claims 2-4, 6, 7, 9, 12-19, 24, and 26-28 likewise would not have been obvious over the Frick '290 patent in view of the Cook '994 patent and further in view of the Maurer '107 patent.

Dependent claims 3, 4, 13, and 14 recite that the seal comprises a pair of elastomeric seals, and that the sensing element is between the elastomeric seals. The Frick '290 patent discloses very little about seals, mentioning only that O-rings may be used to provide various seals. There is certainly no suggestion in the Frick '290 patent that the seals be provided in pairs

with the sensing element 66 being captured between the two seals.

As discussed above, it would not have been obvious to provide the sensing element 66 disclosed in the Frick '290 patent with the conductive elastomeric seal disclosed in the Cook '994 patent. For the same reasons, it would not have been obvious to provide the sensing element 66 disclosed in the Frick '290 patent between the elastomeric seals disclosed in the Maurer '107 patent.

Accordingly, dependent claims 3, 4, 13, and 14 are patentable over the Frick '290 patent in view of the Cook '994 patent and further in view of the Maurer '107 patent.

Dependent claim 22 similarly recites that the sensing element is between a pair of elastomeric seals which capture the sensing element therebetween. The Frick '290 patent discloses very little about seals, mentioning only that O-rings may be used to provide various seals. There is certainly no suggestion in the Frick '290 patent that the seals be provided in pairs with the sensing element 66 being captured between the two seals.

As discussed above, it would not have been obvious to provide the sensing element 66 disclosed in the Frick '290 patent with the conductive elastomeric seal disclosed in the Cook '994 patent. For the same reasons, it would not have been obvious to provide the sensing element 66 disclosed in the Frick '290 patent between the elastomeric seals disclosed in the Maurer '107 patent.

Accordingly, dependent claim 22 is patentable over the Frick '290 patent in view of the Cook '994 patent and further in view of the Maurer '107 patent.

Dependent claim 23 further recites the communication of the electrical signal from the sensing element through the seal to an exterior of the housing. As discussed above, the Frick '290 patent, the Cook '994 patent, and the Maurer '107 patent cannot be combined so as to produce a flow rate sensor that includes a housing in which a pressure change is created, in which the pressure change is sensed using a sensing element, in which the sensing element is sealed, and in which an electrical signal is communicated through the seal from the sensing element to an exterior of the housing.

Accordingly, dependent claim 23 is patentable over the Frick '290 patent in view of the Cook '994 patent and further in view of the Maurer '107 patent.

One combination of the Frick '290 patent and the Cook '994 patent has not been explicitly considered by the Examiner. The piping leg 24 disclosed in the Frick '290 patent could be coupled to the fluid conduit 100 disclosed in the Cook '994 patent, and the piping leg 26 disclosed in the Frick '290 patent could be coupled to the fluid conduit 60 disclosed in the Cook '994 patent. However, this combination of the Frick '290 patent and the Cook '994 patent would not result in the sensing element, the seal, and the restriction being housing in the same housing as required by independent claims 1, 11, and 20. Therefore, independent claims 1, 11, and 20 are patentable even over this combination of the Frick '290 patent and the Cook '994 patent.

9. Appendix

The Appendix containing a copy of the claims involved in this appeal is attached hereto.

This brief is being filed in triplicate as required by 37 C.F.R. §1.192.

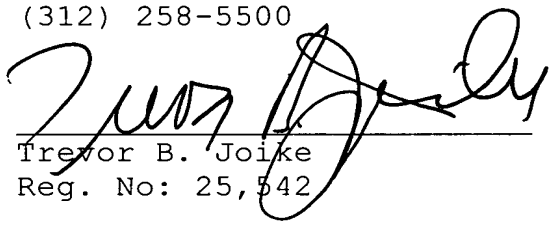
The fee set forth in 37 C.F.R. §1.17(c) is enclosed herein by check. The Commissioner is hereby authorized to charge any deficiency in the amount enclosed or any additional fee which may be required to Deposit Account No. 50-1519.

CONCLUSION

For the foregoing reasons, reversal of the Final Rejection is respectfully requested.

Respectfully submitted,

Schiff, Hardin & Waite
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606
(312) 258-5500

By: 

Trevor B. Joike
Reg. No: 25,542

March 8, 2004

APPENDIX

1. A flow sensor package comprising:

a housing having an inlet, an outlet, and first and second channels in communication with the inlet and the outlet;

a sensing element in the first channel;

a restriction in the second channel; and

a seal engaging the sensing element so as to prevent flow of a fluid past the sensing element, wherein the seal has an electrically conductive path from the sensing element to a lead, and wherein the lead is outside of the housing.

2. The flow sensor package of Claim 1, wherein the housing includes a base and a cover.

3. The flow sensor package of Claim 2, wherein the seal comprises a pair of elastomeric seals, wherein the sensing element is captured between the elastomeric seals, and wherein the elastomeric seals are arranged to prevent leakage between the base and cover.

4. The flow sensor package of Claim 1, wherein the seal comprises a pair of elastomeric seals, and wherein the sensing element is captured between the elastomeric seals.

6. The flow sensor package of Claim 1, wherein the fluid is a liquid or a gas.

7. The flow sensor package of Claim 1, wherein the inlet, the outlet, and the second channel are arranged to permit a flow of the fluid through the housing between the inlet and the outlet, and wherein the sensing element is arranged to sense a pressure change across the restriction.

9. The flow sensor package of Claim 1, wherein the inlet, the outlet, and the second channel are arranged to permit a bidirectional flow of the fluid through the housing between the inlet and the outlet, and wherein the sensing element is arranged to sense a pressure change across the restriction.

11. A flow sensor package comprising:

a housing, an inlet, an outlet, and first and second channels in communication with the inlet and the outlet;

a sensing element in the first channel, wherein the sensing element has first and second opposing sides, wherein the first side is in fluid communication with the inlet, and wherein the second side is in fluid communication with the outlet;

a restriction in the second channel, wherein the restriction permits flow of a liquid through the inlet, the second channel, and the outlet; and

a seal engaging the sensing element so as to prevent flow of the liquid past the sensing element, wherein the sensing element senses a pressure change across the restriction.

12. The flow sensor package of Claim 11, wherein the housing includes a base and a cover.

13. The flow sensor package of Claim 12, wherein the seal comprises a pair of elastomeric seals, wherein the sensing element is captured between the elastomeric seals, and wherein the elastomeric seals are arranged to prevent leakage of the liquid between the base and cover.

14. The flow sensor package of Claim 11, wherein the seal comprises a pair of elastomeric seals, and wherein the sensing element is between the elastomeric seals.

15. The flow sensor package of Claim 11, wherein the inlet, the outlet, and the second channel are arranged to permit a flow of the liquid through the housing between the inlet and the outlet.

16. The flow sensor package of Claim 15, wherein the seal has a conductive path from the sensing element to a lead, and wherein the lead extends outside of the housing.

17. The flow sensor package of Claim 11, wherein the inlet, the outlet, and the second channel are arranged to permit a bidirectional flow of the liquid through the housing between the inlet and the outlet.

18. The flow sensor package of Claim 17, wherein the seal has a conductive path from the sensing element to a lead, and wherein the lead extends outside of the housing.

19. The flow sensor package of Claim 11, wherein the seal has a conductive path from the sensing element to a lead, and wherein the lead extends outside of the housing.

20. A method of determining flow rate through a flow conductor comprising the following steps of:

creating a pressure change within a housing having only two separate housing portions;

sensing the pressure change using a sensing element mounted within the housing;

sealing the sensing element within the housing using a seal; and

communicating an electrical signal from the sensing element to an exterior of the housing.

21. The method of Claim 20, wherein the sealing step comprises the step of sealing leakage between the two separate portions of the housing.

22. The method of Claim 20, wherein the sealing step comprises the step of sealing the sensing element between a pair of elastomeric seals which capture the sensing element therebetween.

23. The method of Claim 20, wherein the communicating step comprises the step of communicating the electrical signal from the sensing element through the seal to an exterior of the housing.

24. The flow sensor package of Claim 1, wherein the seal comprises an elastomeric seal.

25. The method of Claim 20, wherein the step of creating a pressure change within a housing comprises the step of creating the pressure change within the housing by use of a restriction.

26. The flow sensor package of Claim 1, wherein the seal comprises a perimeter commensurate with a perimeter of the sensing element.

27. The flow sensor package of Claim 26, wherein the seal is coaxial with the sensing element.

28. The flow sensor package of Claim 1, wherein the seal is coaxial with the sensing element.